WHAT IS CLAIMED IS:

1.   A packet switch, comprising:
      a plurality of input side transfer units from which
5 packets are entered;
      a plurality of output side transfer units from which
packets are outputted;
      a switching unit through which each packet entered
from each input side transfer unit is switched to a desired
10 output side transfer unit;
      a congestion status monitoring unit configured to
monitor a congestion status of each transfer target within
the packet switch;
      a priority level attaching unit configured to attach a
15 priority level to each packet, according to the congestion
status of a transfer target of each packet monitored by the
congestion status monitoring unit; and
      a packet selection unit configured to select one
packet that is to be transferred at a higher priority among
20 colliding packets when a packet collision occurs within the
switching unit, according to the priority level attached to
each colliding packet.

2.   The packet switch of claim 1, wherein the priority
25 level attaching unit attaches a lower priority level to a
packet for which a congestion level of a transfer target is
higher.

3.   The packet switch of claim 1, wherein the priority
30 level attaching unit is provided inside each input side
transfer unit.

4.   The packet switch of claim 1, wherein the priority
level attaching unit sets a temporarily high priority level
35 to one or a plurality of packets that are to be transferred

to one transfer target initially when the congestion status
of said one transfer target that is referred in order to
attach the priority level to each packet is unknown or
invalid.

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5.   The packet switch of claim 1, wherein the the priority
level attaching unit sets the priority level to be attached
to each packet by referring to a congestion level table
that stores a congestion level set to each prescribed

10   transfer target according to the congestion status
monitored by the congestion status monitoring unit, the
congestion level table being provided for each one or a
plurality of the input side transfer units.

15 6.   The packet switch of claim 1, wherein the congestion
status monitoring unit is provided inside each output side
transfer unit.

7.   The packet switch of claim 6, wherein the congestion

20   status monitoring unit monitors the congestion status of
each prescribed transfer target for a corresponding output
side transfer unit, each class of the corresponding output
side transfer unit, each port of the corresponding output
side transfer unit, each classes of each port of the

25   corresponding output side transfer unit, or each flow of
each class of each port of the corresponding output side
transfer unit.

8.   The packet switch of claim 1, wherein the congestion

30   status monitoring unit notifies a monitored congestion
status such that the monitored congestion status is
reflected into the priority level attached by the priority
level attaching unit.

35 9.   The packet switch of claim 8, wherein the priority

level attaching unit is provided inside each input side
transfer unit, and the congestion status monitoring unit
notifies a prescribed information regarding the monitored
congestion status to one input side transfer unit that has
5   transmitted one packet, at a timing of arrival of said one
packet to the output side transfer unit.

10.   The packet switch of claim 1, further comprising:
     a scheduling unit provided for each input side
10   transfer unit and configured to control an order of
transfers of a plurality of packets that are waiting for
transfers to the switching unit at each input side transfer
unit, such that those packets destined to non-congested
transfer targets are transferred to the switching unit at
15   higher priority by accounting for the congestion status of
a transfer target of each packet.

11.   The packet switch of claim 1, wherein a packet with
the priority level attached thereto is transferred from a
20   input side transfer unit via the switching unit to a output
side transfer unit, the switching unit transfers one
colliding packet selected from colliding packets by
accounting for the priority level attached to each
colliding packet, to the output side transfer unit when a
25   packet collision occurs inside the switching unit while
discarding other colliding packets inside the switching
unit,
     the input side transfer unit re-transmits each
discarded packet when a packet discarding due to the packet
30   collision is detected, and
     the priority level attaching unit is provided at the
input side transfer unit and sets the priority level to be
attached to each re-transmission packet higher than the
priority level originally attached to a corresponding
35   discarded packet.

12. The packet switch of claim 1, wherein a packet with the priority level attached thereto is transferred from a input side transfer unit via the switching unit to an

5 output side transfer unit, the switching unit transfers one colliding packet selected from colliding packets by accounting for the priority level attached to each colliding packet, at higher priority to the output side transfer unit when a packet collision occurs inside the

10 switching unit,

the priority level attaching unit is provided at the input side transfer unit, and

when a plurality of packets subdividing one data are to be transferred from the input side transfer unit, the

15 priority level attaching unit sets the priority level of one packet corresponding to a top portion of said one data lower than the priority level of other packets corresponding to subsequent portions of said one data.

20 13. The packet switch of claim 12, wherein the priority level attaching unit sets the priority level of said one packet than the priority level of the other packets by setting the priority level of the other packets higher than the priority level attached to packets that do not belong

25 to said plurality of packets subdividing one data.

14. The packet switch of claim 1, wherein each input side transfer unit transfers a packet along with the congestion status inside the input side transfer unit at a time of

30 transferring the packet via the switching unit to an output side transfer unit, and

the output side transfer unit obtains a comprehensive congestion status using the congestion status inside the input side transfer unit that is notified along with the

35 packet and the congestion status inside the output side

transfer unit, and carries out a congestion control using the comprehensive congestion status in order to control an amount or a rate of packet flows flowing through a network in which the packet switch is provided.

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15. A packet switch, comprising:

a plurality of input side transfer units from which packets are entered;

a plurality of output side transfer units from which
10 packets are outputted;

a switching unit through which each packet entered from each input side transfer unit is switched to a desired output side transfer unit, the switching unit having a configuration in which no packet collision occurs;
15 a congestion status monitoring unit configured to monitor a congestion status of each prescribed transfer target; and

a connection pattern calculation engine configured to attach a priority level to each packet, according to the
20 congestion status of a transfer target of each packet monitored by the congestion status monitoring unit, carry out a simulation in which each packet is assumed to be transferred through a virtual switching network having a topology in which a packet collision may occur and a packet
25 to be transferred at higher priority among colliding packets is selected according to the priority level attached to each colliding packet when the packet collision occurs in the virtual switching network, and determine a connection pattern of the switching unit such that a result
30 of switching packets at the switching unit coincides with a result of transferring packets from the input side transfer units to the output side transfer units according to the simulation.

35 16. The packet switch of claim 15, wherein the switching

-49-

unit is formed by a cross-bar switch, and the virtual
switching network is a switching network formed by
switching elements.

5   17.   A packet switching method of a packet switch in which
a packet is transferred from an input side transfer unit
via a switching unit to a desired output side transfer
unit, the method comprising:
transferring the packet by attaching a priority level
10   according to a congestion status of a transfer target of
the packet, from the input side transfer unit to the
switching unit;
switching the packet transferred from the input side
transfer unit according to the transfer target of the
15   packet at the switching unit, and transferring one
colliding packet selected from colliding packets by
accounting for the priority level attached to each
colliding packet, at higher priority to the output side
transfer unit when a packet collision occurs within the
20   switching unit; and
notifying information indicating a monitoring result
of the congestion status for a prescribed unit of
monitoring, from the output side transfer unit to which the
packet has reached, to the input side transfer unit which
25   transmitted the packet.

18.   A computer usable medium having computer readable
program codes embodied therein for causing one or a
plurality of computers to function as a packet switch in
30   which a packet is transferred from an input side transfer
unit via a switching unit to a desired output side transfer
unit, the switching unit having a function of selecting one
packet that is to be transferred at a higher priority among
colliding packets when a packet collision occurs within the
35   switching unit, according to a priority level attached to

each colliding packet, the computer readable program codes
include:

a first computer readable program code for causing
said one or a plurality of computers to monitor a
5   congestion status of each transfer target within the packet
switch; and

a second computer readable program code for causing
said one or a plurality of computers to attach the priority
level to each packet, according to the congestion status of
10   a transfer target of each packet monitored by the first
computer readable program code.

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